Comorbid depression and other predictors of PTSD Severity in Toronto Transit Commission (TTC) Employees

Ravi Shah
Research Fellow, Department of Psychiatry
Schulich School of Medicine & Dentistry, University of Western Ontario
Authors

Ravi Shah, MSc, MD
Rosane Nisenbaum, PhD
Catherine Classen, PhD, C. Psych
Rahel Eynan, PhD
Paul Links, MD, FRCP
LEARNING OBJECTIVES

• Discuss the prevalence of traumatic events and PTSD in the general population

• Understand the consequences of PTSD and depression comorbidity

• Identify predictors of PTSD severity
OVERVIEW

- Background
- Acute Psychological Trauma (APT) Study
- Current Study
- Results
- Conclusions
- Strengths
- Limitations
- Future directions
- Questions/Comments
BACKGROUND
TRAUMATIC EVENTS

According to DSM-IV the following two criteria have to be met to be considered as a traumatic event:

1. The person must have experienced, witnessed or been confronted with an event that involves actual or threatened death/injury, or a threat to the physical integrity of oneself or others.

2. The response to this event must involve intense fear, helplessness or horror.
# Lifetime Prevalence

<table>
<thead>
<tr>
<th>Author</th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breslau et al., 1991</td>
<td>43.0</td>
<td>36.7</td>
</tr>
<tr>
<td>Norris, 1992</td>
<td>73.6</td>
<td>64.8</td>
</tr>
<tr>
<td>Kessler et al., 1995</td>
<td>60.7</td>
<td>51.2</td>
</tr>
<tr>
<td>de Vries &amp; Olff, 2009</td>
<td>80.7</td>
<td>80.8</td>
</tr>
</tbody>
</table>

Note: Lifetime prevalence of traumatic events in men and women has been reported in percentage (%).
Facts about Traumatic Events

- Do not affect everyone in the same way.
- Social and personal characteristics of the person exposed to a traumatic event play an important role in symptom severity and post-trauma consequences.
Contd..

For example:

- Consequences of ordinary stressors are mild and are usually influenced by personal characteristics, family predisposition, and psychological health.

- In contrast, extreme stressors are capable of producing mental disorders in most cases irrespective of differences in the risk factors.
CONSEQUENCES OF TRAUMATIC EVENTS

• Personal
• Psychological
• Social
• Occupational
Psychological Consequences

Primary
- Posttraumatic psychological reaction
- Posttraumatic stress disorder (PTSD)

Secondary or associated
- Depression
- Comorbid disorder
- Drug and alcohol abuse
- Sleep problems
FACTORS AFFECTING TRAUMATIC CONSEQUENCES

- Nature of trauma
- Frequency of trauma
- Severity of trauma
- Personal and family history of psychiatric problem
Contd..

- Person’s life experiences before the trauma
- Natural ability to cope stress
- Availability of support from family and friends
- Access to professional help
Posttrauma Psychological Reaction

- Psychological reactions are very common after an exposure to a traumatic event.

- Some people may begin experiencing psychological reaction during the event itself whereas others may experience them after sometime (Norris, Murphy, Baker, & Perilla, 2003).

- Elevated rates of dissociation, re-experiencing, avoidance, and hyper-arousal have been reported in the first few weeks after a traumatic event (Cardena & Spiegel, 1993; Feinstein, 1989; North, Smith, McCool, & Lightcap, 1989; Sloan, 1988).
Contd..

• However, there is evidence that the majority of these early reactions are transient (Bryant, 2003).

• Most people recover from them, and suffer no long-term difficulties; however, 8-12 % may go on to develop PTSD.
POSTTRAUMATIC STRESS DISORDER

• Duration of symptoms > 1 month
• Persistent re-experiencing (e.g. Flashbacks)
• Avoidance of stimuli associated with the trauma
• Hyper-arousal (sleep disturbance, hyper-vigilance)
• Impairment in social, occupational or other area of functioning
# Lifetime Prevalence

<table>
<thead>
<tr>
<th>Author</th>
<th>Overall</th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breslau et al., 1991</td>
<td>9.2</td>
<td>6</td>
<td>11.3</td>
</tr>
<tr>
<td>Kessler et al., 1995</td>
<td>7.8</td>
<td>5</td>
<td>10.4</td>
</tr>
<tr>
<td>Breslau et al., 1998</td>
<td>9.2</td>
<td>6.2</td>
<td>13</td>
</tr>
<tr>
<td>Stuber et al., 2006</td>
<td>14.9</td>
<td>12.1</td>
<td>17.2</td>
</tr>
</tbody>
</table>

Note: Lifetime prevalence of PTSD has been reported in percentage (%).
PTSD AND DEPRESSION COMORBIDITY

- PTSD is often associated with comorbid disorder (80-94%)
  (Dadić-Hero et al., 2009; Logan et al., 2009)

- PTSD with comorbid depression (30-50%)
  (Blanchard et al., 1998; Boundreaux et al., 1998; Brady et al., 2003; Kessler et al., 1995; Nixon et al., 2004)
FACTORS ASSOCIATED WITH PTSD SEVERITY

• PTSD with depression is often associated with greater PTSD severity compared to the PTSD without depression (Blanchard et al., 1998; Momartin et al., 2004; Nixon et al., 2004; Taft et al., 2009).

• Some of the factors associated with PTSD severity are the type and severity of trauma, the number of traumatic events, past psychiatric history, posttrauma social support, peritraumatic emotional responses, and peritraumatic dissociation (Ozer et al., 2003).
FACTORS ASSOCIATED WITH PTSD SEVERITY

- There is an inconsistency in factors that lead to higher PTSD severity, and there is no agreement in the literature on the generalizability of these factors across different populations.

- Population specific findings would be more appropriate and helpful as it would address the existing gap in knowledge.
ACUTE PSYCHOLOGICAL TRAUMA (APT) STUDY
APT STUDY OBJECTIVES

• To evaluate a “Best Practice Intervention” (BPI)

• To examine barriers and facilitators for traumatized TTC employees related to seeking treatment and return to work
APT STUDY DESIGN

• Mixed methods design

• Conducted in the following two phases:

  **Phase I:** Treatment as usual (TAU)

  **Phase II:** Best Practice Intervention (BPI)
SIMILARITIES BETWEEN TAU and BPI PHASES

• Recruited TTC employees exposed to a traumatic event

• Screened for PTSD severity using the Modified PTSD Symptom Scale (MPSS) at one, three, and six months follow-up period

• SCID-I was implemented at the first month assessment for diagnosing Axis-I disorders

• Followed for 6 months after the traumatic event

  - data on treatment seeking, return to work, and other study measures were collected
Differences Between TAU and BPI Phases

• **TAU**
  - Sample size: 62
  - Notified if met the diagnostic criteria for PTSD and/or MDD in SCID-I or scored above 46 on the MPSS.

• **BPI**
  - Sample size: 76
  - Offered BPI if met the diagnostic criteria for PTSD and/or MDD in SCID-I or scored above 46 on the MPSS
CURRENT STUDY
CURRENT STUDY

• The current study was embedded within the APT study and utilized data that was collected prospectively from the study participants.

• All of the 138 participants recruited for the APT study were considered potentially eligible for this study.
**PURPOSE**

To determine whether PTSD with Major Depressive Disorder (MDD) among Toronto Transit Commission (TTC) employees who were exposed to a workplace traumatic event is associated with greater PTSD severity over the six months follow-up period compared to PTSD without MDD, and also to identify predictors of PTSD severity among these employees.
CURRENT STUDY RECRUITMENT

Total Participants
n=138

SCID-I

PTSD without MDD
n=29

PTSD with MDD
n=37

Others
n=72
OBJECTIVES

• To examine the demographic characteristics of two groups: PTSD without MDD and PTSD with MDD;

• To compare the PTSD severity in two groups over the six months follow-up period;

• To examine potential predictors of PTSD severity over the six months follow-up period.
HYPOTHESIS

TTC employees who develop PTSD with MDD after experiencing a traumatic event in the workplace are more likely to exhibit a **poorer outcome in terms of PTSD severity** over the six months follow-up compared to TTC employees who develop PTSD without MDD.
OUTCOME

PTSD severity over the six months follow-up period (assessed at one, three, and six months) measured by the MPSS.
RESULTS
<table>
<thead>
<tr>
<th>Characteristics</th>
<th>PTSD without MDD (N=29)</th>
<th>PTSD with MDD (N=37)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, mean year (SD)</td>
<td>47.34 (9.54)</td>
<td>45.51 (8.79)</td>
<td>0.42</td>
</tr>
<tr>
<td>BPI, n (%)</td>
<td>14 (48.3)</td>
<td>28 (75.7)</td>
<td>0.02</td>
</tr>
<tr>
<td>Female, n (%)</td>
<td>10 (34.5)</td>
<td>11 (29.7)</td>
<td>0.68</td>
</tr>
<tr>
<td>≤ High school, n (%)</td>
<td>11 (37.9)</td>
<td>11 (29.7)</td>
<td>0.48</td>
</tr>
<tr>
<td>Non-Caucasian, n (%)</td>
<td>6 (20.7)</td>
<td>16 (43.2)</td>
<td>0.05</td>
</tr>
<tr>
<td>Married/common- law, n (%)</td>
<td>20 (69)</td>
<td>25 (67.6)</td>
<td>0.90</td>
</tr>
<tr>
<td>Job Type, n (%)</td>
<td></td>
<td></td>
<td>0.31</td>
</tr>
<tr>
<td>Train</td>
<td>5 (17.2)</td>
<td>12 (32.4)</td>
<td></td>
</tr>
<tr>
<td>Bus/streetcar</td>
<td>19 (65.5)</td>
<td>18 (48.6)</td>
<td></td>
</tr>
<tr>
<td>Severe Trauma, n (%)</td>
<td>10 (34.5)</td>
<td>21 (56.8)</td>
<td>0.07</td>
</tr>
<tr>
<td>Time at TTC, median, IQR (months)</td>
<td>108 (228)</td>
<td>108 (105)</td>
<td>0.28*</td>
</tr>
</tbody>
</table>

Note: Reference category not displayed
PTSD Severity
## PTSD Severity

<table>
<thead>
<tr>
<th>Group</th>
<th>1 month</th>
<th>3 months</th>
<th>6 months</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Number</strong></td>
<td>29</td>
<td>27</td>
<td>25</td>
</tr>
<tr>
<td><strong>Mean MPSS score</strong></td>
<td>70.79</td>
<td>49.19</td>
<td>36.05</td>
</tr>
<tr>
<td><strong>SE</strong></td>
<td>3.736</td>
<td>5.425</td>
<td>5.552</td>
</tr>
<tr>
<td><strong>SD</strong></td>
<td>20.116</td>
<td>28.190</td>
<td>27.758</td>
</tr>
<tr>
<td><strong>PTSD without MDD</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Number</strong></td>
<td>37</td>
<td>32</td>
<td>31</td>
</tr>
<tr>
<td><strong>Mean MPSS score</strong></td>
<td>81.36</td>
<td>61.25</td>
<td>41.58</td>
</tr>
<tr>
<td><strong>SE</strong></td>
<td>3.047</td>
<td>4.438</td>
<td>5.272</td>
</tr>
<tr>
<td><strong>SD</strong></td>
<td>18.534</td>
<td>25.105</td>
<td>29.353</td>
</tr>
<tr>
<td><strong>PTSD with MDD</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
PTSD Severity

Graph showing the severity of PTSD over time for two groups:
- PTSD with MDD
- PTSD without MDD

The severity decreases over time (in months).
**Univariate Linear Mixed Model Showing Fixed Effects On PTSD Severity Over 6 Months Follow-up Period**

<table>
<thead>
<tr>
<th>Variables</th>
<th>PTSD severity</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Estimate</td>
<td>SE</td>
<td>P-value</td>
</tr>
<tr>
<td>Time</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 month</td>
<td>-21.118</td>
<td>3.223</td>
<td>0.00</td>
</tr>
<tr>
<td>6 month</td>
<td>-38.036</td>
<td>3.282</td>
<td>0.00</td>
</tr>
<tr>
<td>PTSD with depression</td>
<td>10.556</td>
<td>5.081</td>
<td>0.04</td>
</tr>
<tr>
<td>Female</td>
<td>8.779</td>
<td>5.416</td>
<td>0.11</td>
</tr>
<tr>
<td>Non-Caucasian</td>
<td>10.100</td>
<td>5.427</td>
<td>0.06</td>
</tr>
<tr>
<td>BDI</td>
<td>1.059</td>
<td>0.216</td>
<td>0.00</td>
</tr>
<tr>
<td>Trauma lifetime</td>
<td>1.778</td>
<td>1.194</td>
<td>0.14</td>
</tr>
<tr>
<td>Workplace related stress</td>
<td>-0.440</td>
<td>0.134</td>
<td>0.00</td>
</tr>
<tr>
<td>Dissociative symptoms</td>
<td>0.488</td>
<td>0.208</td>
<td>0.02</td>
</tr>
</tbody>
</table>

Note: The potential predictors were selected using a cut off value P ≤ 0.20
**Multivariate Linear Mixed Model Showing Predictors of PTSD Severity Over 6 Months Follow-up Period**

<table>
<thead>
<tr>
<th>Variables</th>
<th>PTSD severity</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Estimate</td>
<td>SE</td>
<td>P-value</td>
</tr>
<tr>
<td>Time</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 month</td>
<td>-33.195</td>
<td>6.521</td>
<td>0.00</td>
</tr>
<tr>
<td>6 month</td>
<td>-59.996</td>
<td>6.594</td>
<td>0.00</td>
</tr>
<tr>
<td>PTSD with MDD</td>
<td>2.830</td>
<td>4.674</td>
<td>0.54</td>
</tr>
<tr>
<td>Female</td>
<td>3.307</td>
<td>5.932</td>
<td>0.02</td>
</tr>
<tr>
<td>Non-Caucasian</td>
<td>13.328</td>
<td>5.074</td>
<td>0.01</td>
</tr>
<tr>
<td>BDI</td>
<td>0.658</td>
<td>0.265</td>
<td>0.01</td>
</tr>
<tr>
<td>Trauma lifetime</td>
<td>-1.647</td>
<td>1.379</td>
<td>0.50</td>
</tr>
<tr>
<td>Workplace related stress</td>
<td>-0.300</td>
<td>0.129</td>
<td>0.02</td>
</tr>
<tr>
<td>Time* Gender</td>
<td></td>
<td></td>
<td>0.01</td>
</tr>
<tr>
<td>3 month</td>
<td>4.022</td>
<td>6.471</td>
<td>0.53</td>
</tr>
<tr>
<td>6 month</td>
<td>18.126</td>
<td>6.565</td>
<td>0.01</td>
</tr>
<tr>
<td>Time* Trauma LT</td>
<td></td>
<td></td>
<td>0.01</td>
</tr>
<tr>
<td>3 month</td>
<td>3.021</td>
<td>1.436</td>
<td>0.04</td>
</tr>
<tr>
<td>6 month</td>
<td>4.251</td>
<td>1.450</td>
<td>0.00</td>
</tr>
</tbody>
</table>
MULTIVARIATE LINEAR MIXED MODEL
(Time by gender interaction)
MULTIVARIATE LINEAR MIXED MODEL
(Time by gender interaction)
MULTIVARIATE LINEAR MIXED MODEL
(Time by lifetime trauma interaction)
CONCLUSIONS
CONCLUSIONS

• Severity of depression was positively associated with PTSD severity over the six months follow-up period.

• Female TTC workers were showing significantly greater PTSD severity compared to male TTC workers at the six months follow-up period.

• Non-Caucasian TTC workers were experiencing significantly greater PTSD severity compared to Caucasian over the six months follow-up period.
CONCLUSIONS

• Higher workplace related stress was associated with greater PTSD severity over the six months follow-up period.

• The number of lifetime trauma at the three and six month assessments was positively associated with PTSD severity.
This is the first PTSD and MDD comorbidity study to focus on the PTSD severity in transit population.

The study accounts for entire traumatized transit employees as opposed to only bus drivers or subway operators.

The gender and ethnicity differences in PTSD severity are unique findings that carry a lot of importance for the transit organization.

May assist in formulating future guidelines for treatment strategies and reduce the financial burden for WSIB and the transit organization.
LIMITATIONS

• Lack of diagnostic measures at three and six months to assess PTSD and MDD comorbidity.

• May have limited ability to generalize this result to other workplace or smaller transit populations.

• Small sample size

• Difficult population to study
May consider implementing diagnostic measures of PTSD and depression for all assessments and conduct a study with a larger sample size.

May consider number of PTSD symptoms rather than PTSD diagnosis for predicting PTSD severity.

May also consider using other measures of PTSD severity such as Clinician Administered PTSD Scale (CAPS), Posttraumatic Stress Diagnostic Scale (PDS) to establish the link between PTSD severity and PTSD with MDD.

May consider a qualitative approach to explore the experience of PTSD severity in women employees.
FUNDING

Supported by a grant from Workplace Safety and Insurance Board Research Advisory Council
QUESTIONS AND COMMENTS

THANK YOU